

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN OR RELATING TO GLOVES AND THE LIKE

(71) We, DART INDUSTRIES INCORPORATED, (formerly REXALL DRUG AND CHEMICAL COMPANY,) a Corporation organised and existing under the laws of the State of Delaware, United States of America, of 8408, Beverly Boulevard, Los Angeles, State of California 90054, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to rubber gloves or the like and methods of making them. More specifically, (but not exclusively) it relates to rubber surgeons gloves having inside surface characteristics different from the outside, such distinguishing characteristics being imparted to the glove by a novel method of manufacture.

The invention provides the method of forming a rubber latex glove or the like dusted with an anti-friction powder on one side only comprising the steps of dipping a form for said glove or the like into a rubber latex solution to deposit a film thereon; curing the deposited rubber to vulcanize the film; halogenating the external surface of the glove or the like so formed sufficiently to render said surface non-adherent to anti-friction powders; stripping the glove or the like from the form and applying an anti-friction powder thereto; and tumbling the glove or the like to remove dust from the halogenated surface thereof.

It is preferred that said halogenation step comprises chlorination.

It is further preferred that said chlorination step comprises dipping the glove or the like in an aqueous solution containing chlorine.

More specifically it is preferred that said solution contains about 1200 ppm dissolved chlorine gas and said glove or the like is dipped for about 30 seconds therein.

The glove or the like may be rinsed in a sterile solution prior to use.

The invention includes a glove or the like made in accordance with the methods specified above.

The invention also provides a rubber latex glove or the like having a dust-free external surface formed thereon by halogenation to render said surface non-adherent to anti-friction powder and an interior surface dusted with an anti-friction powder in sufficient quantity to facilitate donning.

It is preferred that the glove or the like is formed by the method comprising the steps of dipping a form for said glove or the like into a rubber latex solution to deposit a film thereon; curing the deposited rubber to vulcanize the film; halogenating the external surface of the glove or the like sufficiently to render said surface non-adherent to anti-friction powders; stripping the glove or the like from the form and applying an anti-friction powder thereto; and tumbling the glove or the like to remove dust from the halogenated surface thereof.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings of which:—

Figure 1 is a schematic view showing a surgeons glove as initially shaped on a form therefor,

Figure 2 is another schematic view showing the surgeons glove being stripped from a form; and

Figure 3 is a perspective view of the stripped surgeons glove showing a cuffed portion to expose the interior surface.

Referring now to the drawings, surgeons gloves are formed by first dipping the hand-shaped form 10 in a coagulant for natural rubber latex and then dipping the form in a rubber latex solution for a time sufficient to form a glove 11 of the desired thickness thereon.

Following the dipping procedure, the deposited rubber is cured to vulcanize the film, and

various treatments, such as leaching of the gloves, may be conducted; and then the gloves are allowed to dry.

While still on the form, the gloves are halogenated to change the surface characteristics sufficiently so that lubricating dust will not adhere to the surface. Due to the deleterious effects that over-halogenation can have upon rubber articles, the step must be rather precisely controlled to halogenate the natural surface only to the extent that is necessary to produce a surface to which lubricating powders will not adhere. This is done according to a preferred method of the invention by introducing the glove on the form into a halogen containing solution. In this manner, the amount of halogenation of the surface of the formed rubber glove can be accurately controlled by the length of the dip time and the concentration of halogenating constituents. Advantageously the halogenating constituents are those selected from the group consisting of chlorine and bromine, and preferably chlorine is used.

Following the dipping of the glove's surface, the glove can be rinsed if necessary to remove excess materials, and is then dried.

During the stripping operation, as depicted in Figure 2, a lubricating or dusting powder 12 is applied to the glove 11. The common dusting powder used is a sterilizable corn starch of the type that is biologically absorbable and suitable for the purpose of lubricating surgeons gloves. When the glove is stripped, it is turned outside in. After the stripping operation, the glove is reversed to its normal position and tumbled to remove the lubricating powder from the outside thereof. The resulting article is a surgeons glove as shown in Figure 3 with a dusted inside surface 13 and a substantially dust free outside surface. What little dusting powder remains can be readily removed by rinsing in a sterile saline, water or alcohol solution as often prescribed for pre-operative procedures.

The following specific example illustrates the invention and specific conditions that can be used to make a dual finished surgeons glove:

EXAMPLE

A number of surgeons gloves were prepared by dipping forms into a compounded natural rubber latex mixture in accordance with conventional procedures.

The mixture had the following composition:

Constituents	Parts by Weight
Latex Solids	100 parts
Sulfur	1 part
Zinc Oxide	$\frac{1}{2}$ part
Zinc Salt of Mercapto benzothiazole	1 part
Zinc dimethyldithiocarbamate	$\frac{1}{2}$ part
4,4'-Thiobis(6-tert-butyl-m-cresol)	$\frac{1}{2}$ part

Water sufficient to bring total solids to about 45%.

The gloves were then permitted to cure on their forms. The forms with the surgeons gloves were then dipped for a period of 30 seconds in an aqueous solution containing 1200 p.p.m. chlorine gas.

The gloves were permitted to dry. Then they were dusted and stripped, tumbled to remove excess dust, and then turned right side out. The gloves were tumbled again in the presence of an air jet to remove excess dust from the outside surfaces. Inspection indicated that the inside of the glove had sufficient lubricating powder adhering thereto to facilitate donning, while the exterior surface of the glove was substantially free of dusting particles.

The gloves treated in accordance with the above procedure were found to have between .002 and .008 grams of dust on the outside and between .050 and .150 grams on the inside. Comparable gloves which were not treated in the chlorine containing solution were found to have between 0.1 to 0.15 grams on the outside and between 0.13 and 0.2 grams on the inside.

Surgeons gloves formed from rubber may have a natural tackiness that causes clinging to the hand and fingers and makes donning the gloves difficult. To overcome this problem, the gloves may be "dusted" with an anti-friction lubricating powder or dust such as corn starch, which serves as a surface lubricant. This anti-friction lubricating powder may be placed upon the rubber surgeons gloves during the manufacturing process as an aid to stripping the gloves from the hand shaped form upon which they are formed by dipping and curing. Inasmuch as the gloves are turned inside out as they are stripped, the application of dust to the exterior surface may eliminate binding due to cohesion as the glove is stripped.

Even though the gloves, and the lubricating powder which has been applied to them, are sterilized before use, a possibility of inducing granuloma exists if the lubricating powders are brought into contact with a surgical opening. Therefore, it is highly desirable to eliminate as much powder as possible on the external surface of a surgeons glove. To this end, gloves may be tumbled or vibrated after the application of lubricating powder in an attempt to remove excess powder from the external surfaces thereof. However, due to surface tackiness, a substantial amount of the powder may remain. Even rinsing of the outside surfaces of the gloves in sterile alcohol, water or saline solutions may not remove all of the powder accumulated on the glove surfaces.

The glove described in the specific embodiment set out above may enable this problem to be overcome, since the tendency of powder

to remain on the outside surface of the glove is reduced.

WHAT WE CLAIM IS:—

- 5 1. The method of forming a rubber latex glove or the like dusted with an anti-friction powder on one side only comprising the steps of dipping a form for said glove or the like into a rubber latex solution to deposit a film thereon; curing the deposited rubber to vul-
- 10 canize the film; halogenating the external surface of the glove or the like so formed sufficiently to render said surface non-adherent to anti-friction powders; stripping the glove or the like from the form and applying an anti-
- 15 friction powder thereto; and tumbling the glove or the like to remove dust from the halogenated surface thereof.
2. The method as claimed in claim 1 in which said halogenation step comprises chlori-
- 20 nation.
3. The method as claimed in claim 2 in which said chlorination step comprises dipping the glove or the like in an aqueous solution containing chlorine.
- 25 4. The method as claimed in claim 3 in which said solution contains about 1200 p.p.m. dissolved chlorine gas and said glove or the like is dipped for about 30 seconds therein.
- 30 5. The method as claimed in any one of the preceding claims in which said glove or the like is rinsed in a sterile solution prior to use.
6. A method of forming a glove substantially

as hereinbefore described with reference to the accompanying drawings.

7. A glove or the like when formed according to any one of the preceding claims. 35

8. A rubber latex glove or the like having a dust-free external surface formed thereon by halogenation to render said surface non-adherent to anti-friction powder and an interior surface dusted with an anti-friction powder in sufficient quantity to facilitate donning. 40

9. A rubber latex glove or the like as claimed in claim 8 wherein said glove or the like is formed by the method comprising the steps of dipping a form for said glove or the like into a rubber latex solution to deposit a film thereon; curing the deposited rubber to vulcanize the film; halogenating the external surface of the glove or the like sufficiently to render said surface non-adherent to anti-friction powders; stripping the glove or the like from the form and applying an anti-friction powder thereto; and, tumbling the glove or the like to remove dust from the halogenated surface thereof. 50 55

10. A glove substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

